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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/742,433	12/22/2000	Tomoyuki Hiroki	35.G2698	8881

5514 7590 10/06/2003

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EXAMINER

ZERVIGON, RUDY

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 10/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

File Copy

Office Action Summary	Application No.	Applicant(s)	
	09/742,433	HIROKI, TOMOYUKI	
	Examiner	Art Unit	
	Rudy Zervigon	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 April 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 29 July 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on April 23, 2003; May 20, 2003; and June 25, 2003 have been entered.

Drawings

2. The drawings were received on April 23, 2003 and July 29, 2003. These drawings are acceptable.

Claim Rejections - 35 USC § 102

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1-4 are rejected under 35 U.S.C. 102(b) as being anticipated by Yoshinao Miyata (USPat. 5,992,974). Yoshinao Miyata teaches a method ("Detailed Description") of manufacturing a liquid jet recording head (Fig.5h) which comprises an element substrate ("silicon monocrystal"; 40; Figures 5(a)-5(h); column 6, lines 21-28) provided with a plurality of discharge energy generating elements (44, 47, 45; column 6, lines 47-50) for applying discharge

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energy (column 3, lines 34-41) to a recording liquid in accordance with image data (column 2, lines 13-45, abstract). Yoshinao Miyata further teaches:

- i. a liquid chamber (2, all Figures where shown)
- ii. a top plate (6, Figs.1(a), 2, 5(h)) having a plurality of nozzles (7) and made from silicon wafer having a <110> orientated surface (column 3, lines 41-48)
- iii. the top plate and the element substrate are “jointed” (column 7, lines 49-53) so that each of the discharge energy generating elements face the respective nozzle (7, Figure 5(h))
- iv. a mask layer (“protecting layer”, 41; column 8, lines 20-27) provided on a nozzle surface (lower surface of 6, Figure 5(a) and 5(h)) of the top plate
- v. compensation patterns (7,2) extending to a liquid chamber region (2) in order to from the nozzles and the liquid chamber by anisotropic etching (claim 8; column 5, lines 17-23)
- vi. steps for performing anisotropic etching of the top plate through the mask layer and forming the liquid chamber to have a substantially rectangular shape at the nozzle surface of the top plate by over-etching portions with the compensation patterns – column 7, line 65 – column 8, line 6
- vii. compensation patterns (61,7,51; Fig.7(a)) are comb-shaped (Figure 7(a)) and are arranged to oppose each other so as to define a ladder-shaped opening region between the compensation patterns at the center portion (7) of the liquid chamber region
- viii. compensation patterns (61,7,51; Fig.7(a)) are arranged to oppose each other so as to define a substantially H-shaped opening region between the compensation patterns at the center portion (7) of the liquid chamber region

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- ix. a step of performing anisotropic etching (column 7, line 65 – column 8, line 6) of the top plate (column 3, lines 41-54) using the compensation patterns as a mask so that:
 - a. to top plate is over-etched (7; Fig.5(h))
 - b. the compensation patterns (material filling 61,7,51; Fig.7(a) prior to etching) extending into the liquid chamber region (2) are removed (voids 61,7,51; Fig.7(a) resulting from etching)
 - c. the liquid chamber having a substantially rectangular shape (Fig.5(h)) at the nozzle surface of the top plate is formed

Claim Rejections - 35 USC § 103

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshinao Miyata (USPat. 5,992,974). Yoshinao Miyata is discussed above. Yoshinao Miyata further teaches compensation patterns (7; Figure 2) “lines” (interpreted as vertices) having an angle of 35° (both sides) relative to the <111> plane in the nozzle direction of the silicon wafer (6; column 3, line 64). Yoshinao Miyata further teaches at least one line (line at “7”; Figure 2) parallel to the nozzle array direction, and the compensation patterns (7; Figure 2, 7(a)) are arranged to oppose each other (Figure 7(a)) separated by an opening region (51) in the center portion of the liquid chamber region. Yoshinao Miyata does not teach “lines” having angles of 55° and 71° relative to the <111> plane in the nozzle direction of the silicon wafer.

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize Yoshinao Miyata's 35° angle formed between a compensation pattern line and the <111> plane of the silicon wafer to 55° and 71° in the nozzle direction of the silicon wafer.

Motivation to optimize Yoshinao Miyata's 35° angle formed between a compensation pattern line and the <111> plane of the silicon wafer to 55° and 71° in the nozzle direction of the silicon wafer is to optimize directional flow rate of the ejected ink.

Response to Arguments

7. Applicant's arguments filed April 23, May 20, and June 25, 2003, have been fully considered but are not persuasive.

8. Applicant states, in the response of June 25, 2003, that "while the nozzle plate 6 contains a nozzle 7, it does not contain a liquid chamber. The liquid chamber in Miyata is formed in the base material 42 via anisotropic etching, as shown in Fig. 5(a)-(g). Then, the nozzle plate is bonded to this etched base material (col. 7, lines 42-52). Therefore, it is clear that the nozzle 7 cannot be a "compensation pattern" as presently claimed." The Examiner disagrees. Specifically, Miyata's nozzle 7 both is part of a liquid chamber (Figure 5(h)) and itself contains a liquid chamber volume (Figure 2). As such Miyata's compensation patterns (61,7,51; Fig.7(a)) are directly analogous to Applicant's compensation patterns (cross-hatched portions 10; Figure 2A) that are also depicted in Figure 2A to encompass nozzles 3.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (703) 305-1351. The examiner can normally be reached on a Monday through Thursday schedule from 8am

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through 7pm. The official after final fax phone number for the 1763 art unit is (703) 872-9311. The official before final fax phone number for the 1763 art unit is (703) 872-9310. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (703) 308-0661. If the examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (703) 308-1633.

Gregory L. Mills
9/29/3